

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
26 July 2001 (26.07.2001)

PCT

(10) International Publication Number
WO 01/53127 A1

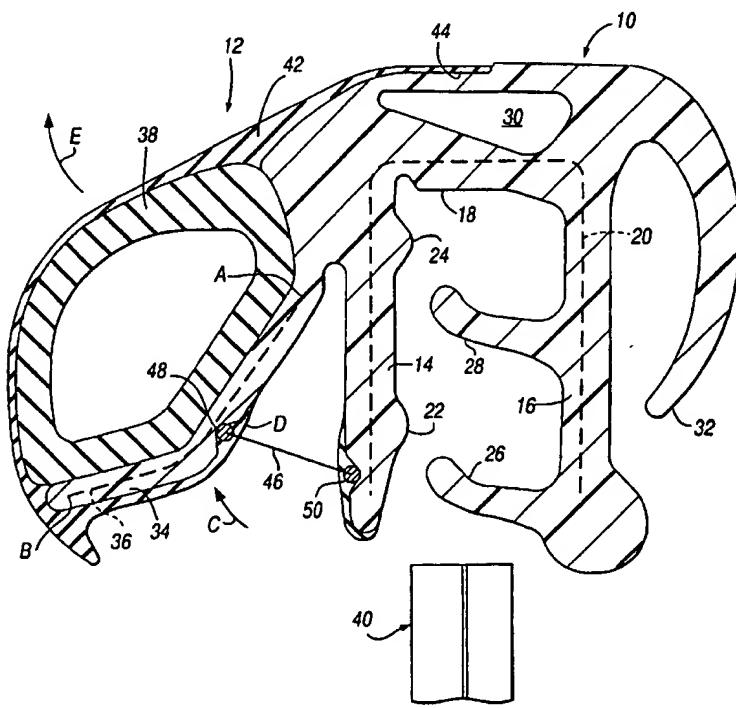
- (51) International Patent Classification⁷: **B60J 10/08, 10/00**
- (21) International Application Number: **PCT/GB00/04998**
- (22) International Filing Date: **29 December 2000 (29.12.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
0001138.7 18 January 2000 (18.01.2000) GB
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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(54) Title: **SEALING ARRANGEMENTS**



WO 01/53127 A1



(57) Abstract: A sealing arrangement, such as for a vehicle door opening, comprises a channel-shaped mounting or gripping portion (10) for embracingly gripping a mounting flange (40) extending around the door opening. The mounting portion (10) integrally includes an outwardly inclined support member or lip (34) on which is supportingly mounted a tubular seal (38) so as to be presented to and to be sealingly compressed by the closing door. The tubular seal (38) is advantageously made of open-cellular thermoplastic elastomer material, and is covered by a skin-like covering (42) of closed-cellular thermoplastic elastomer material. The skin-like covering (42) extends from the mounting portion (10), over the outside of the tubular seal (38) and partially over the surface of the support member (34) facing the outside of the one of the channel side walls (14) of the mounting portion (10). The support member (34) may incorporate a longitudinally compressible metal reinforcement (36),

which is relatively stiff in the perpendicular direction (arrow C) for preventing wrinkling of the tubular seal (38) at bends or corners in the surround. In order to hold the sealing portion (12) in the correct attitude relative to the mounting portion (10), the sealing arrangement incorporates a web (46) made of textile or similar fabric material which is longitudinally stretchable but resistant to width-wise stretching - but is readily compressible so as not adversely to effect compressibility of the sealing portion (12).



Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SEALING ARRANGEMENTS

The invention relates to sealing arrangements. Sealing arrangements embodying the invention and to be described in more detail below by way of example only may be used, for example, in motor vehicle body construction, such as for sealing around doors and other openings.

According to the invention, there is provided a longitudinally extending sealing arrangement, comprising a mounting portion adapted for mounting the sealing arrangement along the surround of a closable opening, a longitudinally extending sealing portion carried by the mounting portion so as to run along at least part of the length of the surround and to be sealingly compressed by a closure member for the opening, and a web-shaped connecting member extending along the length of the sealing arrangement and interconnecting the mounting portion and the sealing portion to hold the sealing portion in a desired attitude with respect to the mounting portion.

According to the invention, there is further provided a sealing arrangement for sealing around an opening in a motor vehicle body which is closable by a closure member, comprising a channel-shape mounting portion made of flexible and resilient plastics or rubber or similar material such as thermoplastic elastomer for embracingly gripping a surround of the door opening, a support member extending longitudinally along the sealing arrangement and projecting from the base of the channel of the mounting

portion and incliningly outward away from the outside of a first one of the side walls of the channel to provide a support surface facing away from the mounting portion, a soft resilient and flexible seal extending longitudinally along the sealing arrangement and mounted on the mounting surface so as to be sealingly compressed by the closing closure member when the mounting portion is mounted on the surround and made of plastics or rubber or similar material such as a thermoplastic elastomer material, a skin-like covering extending from the outside of the mounting portion over the outside of the seal and partially over the support member on a second surface thereof facing the outside of the first channel side wall but being clear of that side wall, and a web-like strip of fabric interconnecting the outside of the first channel side wall and the second surface of the support member, the web-like strip extending along the length of the sealing arrangement and being longitudinally stretchable, resistant to width-wise stretching but readily compressible width-wise, whereby to hold the sealing portion in a desired attitude relative to the mounting portion when the mounting portion is mounted on the surround.

Sealing arrangements embodying the invention will now be described, by way of example only, with reference to the accompanying drawing which is a diagrammatic cross-section through one of the sealing arrangements.

The sealing arrangement shown in the Figure comprises a longitudinally extending channel-shaped mounting or gripping portion 10 which supports a similarly extending

hollow tubular sealing portion 12. The sealing arrangement is preferably produced by extrusion, but any other suitable process, such as moulding, may be used instead. The sealing arrangement is made of suitable plastics or rubber material and is preferably made from a thermoplastic elastomer. The gripping portion 10 comprises material defining opposite side walls 14,16 integral with a base 18. Preferably, a channel-shaped reinforcing core or carrier 20 is embedded in the extruded material of the side walls 14,16 and the base 18. Carrier 20 may be made of any suitable preferably resilient material, advantageously metal. It may comprise metal in the form of an unslit or slit channel, or it may comprise a series of U-shaped elements (inverted in the view shown in the Figure) which are arranged side by side along the length of the channel to define the channel and are either entirely disconnected from each other or integrally connected by flexible connecting links. Instead, looped wire may be used. Other forms of carrier can be used instead.

The carrier 20 is preferably incorporated in the material of the gripping portion 10 by a cross-head extruder process.

As shown in the Figure, channel 14 is formed with two longitudinal ridges 22,24, and the side wall 16 is formed with two longitudinal lips 26,28 which extend substantially across the width of the channel.

To increase the resilience of the gripping portion 10, and to reduce its weight, the

material of the base 18 of the gripping portion may incorporate a longitudinally extending hollow chamber 30.

The material of the gripping portion is extended sideways from the base 18 to form a lip 32 which extends along the length of the sealing arrangement and is curved over towards the outside of the side wall 16. Lip 32 is a so-called "cosmetic lip" for a purpose to be described.

On the opposite side of the channel of the gripping portion 10, side wall 14 integrally carries a support member or lip 34. The support lip 34 preferably incorporates a reinforcing member 36 which extends along the length of the sealing arrangement and also extends substantially to the distal end of the lip 34.

As shown in the Figure, a longitudinally extending tubular seal 38 is supported on the support lip 34. The tubular seal 38 may be produced separately from the remainder of the sealing arrangement.

The tubular seal 38 may be softer and more flexible than the remainder of the extruded material, and may, for example, be spongy or of cellular construction.

In use, the gripping portion 10 is embracingly mounted on the flange which extends around the door opening on a motor vehicle body, where the inner and outer body

panels are welded together. This flange is shown diagrammatically at 40 in the Figure. When the gripping portion 10 is forced onto the flange 40, the ends of the lips 26,28 bear against one side face of the flange, and the ridges 22,24 bear against the opposite side face thereof. In this way, and aided by the resilient of the carrier 20, the gripping portion 10 is securely mounted on the flange 40 and supports the sealing portion 12 so that it runs around the periphery of the opening, lying on the outside thereof. The closing door for the opening thus partially compresses the tubular seal 38 to form a weather-tight seal around the closed door opening. The material of the integral lips 26,28 of the gripping portion 10 may be softer than the remainder of the channel-shaped material. This increases the co-efficient of friction of the material, and helps to secure the gripping portion 10 securely on the flange.

The cosmetic lip 32 becomes positioned on the inside of the vehicle body, around the door opening, and can be used to hide the edge of a trim panel.

The use of thermoplastic elastomer material for the sealing arrangement is advantageous because of its very low weight, ease of manufacture, and recyclability. The thermoplastic elastomer material of the tubular seal 38 is preferably of soft open-cellular form. In order to protect it against ingress of moisture, it is covered with a co-extruded skin 42 which may be of closed-cellular form (but otherwise of similar material).

In order to provide good sealing, it is desirable that the material of the tubular seal 38 should be very soft and flexible. In this way, it can provide effective sealing even if there are discontinuities or variations in the thickness of the flange 40. Soft material is also advantageous because it may be of cellular form and therefore light in weight. However, it is necessary for the sealing arrangement to be bent to follow curves or corners in the door frame. When bent in this way, there will therefore be a tendency for the sealing portion 12 to become wrinkled at the curves or corners as the sealing arrangement is bent around the frame - with the mouth of the channel of the gripping portion 10 facing radially outwardly of the curve or corner. The softer is the sealing portion 12, the greater will this wrinkling tendency be. The purpose of the reinforcement 36 in the support lip 34 is to eliminate or reduce this wrinkling tendency. The reinforcement may comprise a length of looped wire of generally zig-zag configuration, or a thin metal sheet with longitudinally extending generally parallel grooves. The reinforcement 36 is designed to be relatively compressible in the "width" direction, that is, relatively compressible in response to forces acting between points A and B, but relatively stiff to forces acting in the direction of the arrow C, that is, generally perpendicular to the major plane of the lip 34. The incorporation of the reinforcement 36 helps to reduce or substantially eliminate any tendency of the tubular seal 38 to wrinkle at, or bridge across, bends or curves in the mounting flange - but at the same time it does not reduce the effective softness of the sealing portion 12 in response to the closing door.

The skin 42 extends not only over the outside of the tubular seal 38 but also extends over part of the outside surface of the gripping portion 10 and lies in a recess 44. Its opposite edge extends over the underside of the support lip 34 for about half its length, to terminate along a line D. The skin 42 thus helps to hold the tubular seal 38 on the support lip 34.

It will be appreciated that the orientation of the sealing arrangement when mounted along the horizontal top run of the door frame will be inverted as compared with the orientation shown in the Figure. There will therefore be a tendency for the support lip 34 and the tubular seal 38 to flex outwardly in the general direction of the arrow E, in response to the effect of gravity. This is unsatisfactory because the sealing portion 12 may assume a position which is not correct for optimum sealing when the door closes onto it. In order to prevent this, therefore, a flexible web 46 extends between an anchorage point 48 on the inner face of the support lip 34 and an anchorage point 50 on the outside of the side wall 14 of the channel of the gripping portion 10, adjacent its mouth. This web may be of textile or fabric form and is anisotropic. More specifically, it is longitudinally stretchable (that is, stretchable in the direction of the sealing arrangement) but is resistant to width-wise stretching (that is, in the direction extending between the support lip 34 and the side wall 14 of the gripping portion 10). In this way, therefore, the web 46 does not impair the longitudinal flexibility of the sealing arrangement but firmly prevents outward movement of the tubular seal in the direction of the arrow E. However, the fabric of the web 46 is readily compressible

in the width-wise direction, and it therefore does not impair the compressibility of the sealing arrangement in response to the closing door. More specifically, the use of a textile or fabric anisotropic web 46 is advantageous as compared with alternative arrangements in which the web 46 is omitted but, instead, the skin 42 bridges across the gap between the support lip 34 and the side wall 14 of the gripping portion 10. Such an alternative arrangement reduces the compressibility of the sealing portion 12 because of the relative stiffness of the skin 42.

CLAIMS

1. A longitudinally extending sealing arrangement, comprising a mounting portion (10) adapted for mounting the sealing arrangement along the surround (40) of a closable opening, and a longitudinally extending sealing portion (12) carried by the mounting portion (10) so as to run along at least part of the length of the surround and to be sealingly compressed by a closure member for the opening, characterised by a web-shaped connecting member (46) extending along the length of the sealing arrangement and interconnecting the mounting portion (10) and the sealing portion (12) to hold the sealing portion (12) in a desired attitude with respect to the mounting portion (10).
2. A sealing arrangement according to claim 1, characterised in that the web-shaped connecting member (46) comprises material which is relatively stretchable in the longitudinal direction of the sealing arrangement, resistant to width-wise stretching but relatively compressible widthwise.
3. A sealing arrangement according to claim 1 or claim 2, characterised in that the web-like connecting member (46) is made of anisotropic fabric or textile material.
4. A sealing arrangement according to any preceding claim, characterised by a support member (34) extending longitudinally along the length of the sealing

arrangement and projecting in a generally sideways direction from and flexibly supported by the mounting portion (10), the sealing portion (12) being mounted on the support member (34) so as to presented thereby to the closing closure member when the mounting portion (10) is mounted on the surround (40), the web-like connecting member (46) extending between the support member (34) and the mounting portion (10).

5. A sealing arrangement according to any preceding claim, characterised in that the mounting portion (10) is channel-shaped for embracingly gripping the surround (40).

6. A sealing arrangement according to claim 4, characterised in that the mounting portion (10) is channel-shaped for embracingly the surround (40), the web-like connecting member (46) extending from the outside of one channel side wall of the mounting portion (10) to the support member (34).

7. A sealing arrangement according to claim 4 or 6, characterised in that the support member (34) comprises flexible or resilient material in which is embedded a reinforcement (36) which is compressible in the direction longitudinally of the sealing arrangement but stiff in the direction perpendicular to the major plane of the support member (34).

8. A sealing arrangement according to any preceding claim, characterised in that the mounting portion (10) and the sealing portion (12) comprise plastics or rubber material or similar material.
9. A sealing arrangement according to claim 8, characterised in that a reinforcing resilient core or carrier (20) is embedded in the material of the mounting portion (10).
10. A sealing arrangement according to any one of claims 1 to 7, characterised in that at least the sealing portion (12) substantially comprises a thermoplastic elastomer material.
11. A sealing arrangement according to claim 10, characterised in that the sealing portion (12) has an outer skin-like covering (42).
12. A sealing arrangement according to any one of claims 4,6 and 7, characterised in that the sealing portion (12) has an outer skin-like covering (42), the skin-like covering (42) extending over the sealing portion (12) and partially over the support member (34), for at least partially securing the sealing portion (12) to the support member (34).
13. A sealing arrangement according to claim 11 or 12, characterised in that the sealing portion (12) comprises flexible open-cellular thermoplastic elastomer material

and the skin-like covering (42) comprises closed-cellular material.

14. A sealing arrangement for sealing around an opening in a motor vehicle body which is closable by a closure member, comprising a channel-shaped mounting portion (10) made of flexible and resilient plastics or rubber or similar material such as thermoplastic elastomer for embracingly gripping a surround (40) of the door opening, a soft resilient and flexible seal (38) extending longitudinally along the sealing arrangement and supported from the mounting portion (10) so as to be sealingly compressed by the closing closure member when the mounting portion (10) is mounted on the surround (40) and made of plastics or rubber or similar material such as a thermoplastic elastomer material, and a skin-like covering (42) extending from the outside of the mounting portion (10) over the outside of the seal (38) characterised by a support member (34) extending longitudinally along the sealing arrangement and projecting from the base of the channel of the mounting portion (10) and incliningly outward away from the outside of a first one of the side walls of the channel to provide a support surface facing away from the mounting portion (10), the seal (38) being mounted on the support surface the skin-like covering (42) extending partially over the support member (34) on a second surface thereof facing the outside of the first channel side wall but being clear of that side wall, and by a web-like strip (46) of fabric interconnecting the outside of the first channel side wall and the second surface of the support member (34), the web-like strip (46) extending along the length of the sealing arrangement and being longitudinally stretchable, resistant to width-

wise stretching but readily compressible width-wise, whereby to hold the seal (38) in a desired attitude relative to the mounting portion (10) when the mounting portion (10) is mounted on the surround (40).

15. A sealing arrangement according to claim 14, characterised in that the seal (38) is of hollow tubular form.

16. A sealing arrangement according to claim 15, characterised in that the seal (38) is made of open-cellular thermoplastic elastomer material and the skin-like covering (42) is of closed-cellular form.

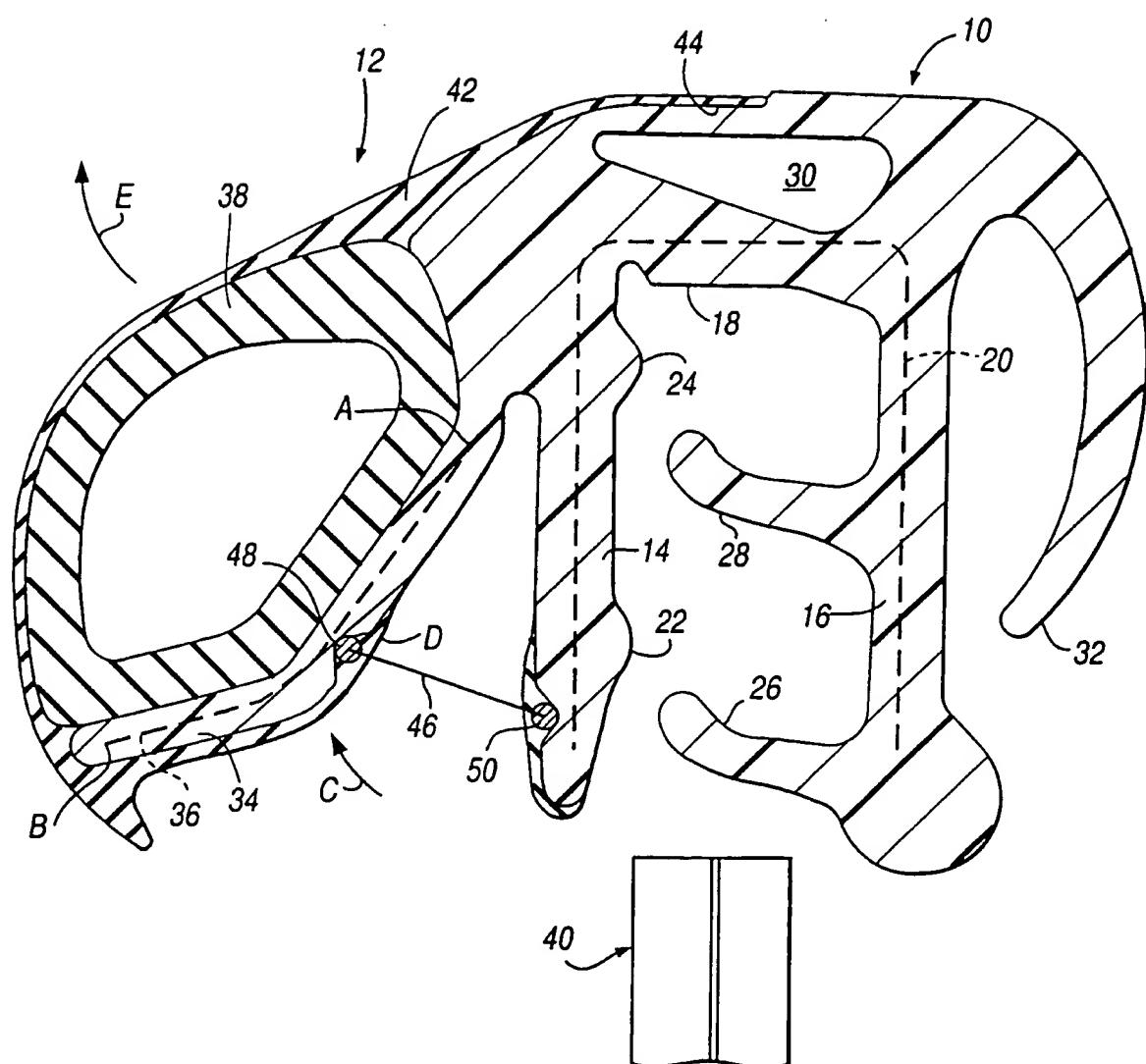
17. A sealing arrangement according to any one of claims 14 to 16, characterised in that the material of the mounting portion (10) has embedded within it a resilient channel-shape reinforcing carrier (20).

18. A sealing arrangement according to any one of claims 14 to 17, characterised in that the inner face of at least one side wall of the channel includes an integral lip (22,24,26,28) extending across the width of the channel and along the length of the sealing arrangement for frictionally contacting a side surface of the surround (40).

19. A sealing arrangement according to any one of claims 14 to 18, characterised in that the support member (34) incorporates reinforcing material (36) which is

compressible in the direction longitudinally of the strip but stiff in the direction which is substantially perpendicular to the major plane of the support member (34).

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/04998

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60J10/08 B60J10/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 178 064 A (SCHLEGEL UK HOLDINGS) 16 April 1986 (1986-04-16) page 11, line 23 -page 12, line 13; claims 1,12,13; figures 7,8 ---	1,14
A	EP 0 385 222 A (METZELER GMBH) 5 September 1990 (1990-09-05) figures 1-11 ---	1
A	GB 2 305 202 A (DRAFTEX IND LTD) 2 April 1997 (1997-04-02) figures 3-8 ---	1
A	FR 2 718 392 A (TECHNISTAN) 13 October 1995 (1995-10-13) figures 1,2 ---	1
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *&* document member of the same patent family

Date of the actual completion of the international search

26 March 2001

Date of mailing of the international search report

30/03/2001

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/04998

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 327 451 A (DRAFTEX IND LTD) 27 January 1999 (1999-01-27) figure 2 -----	1

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Information on patent family members

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